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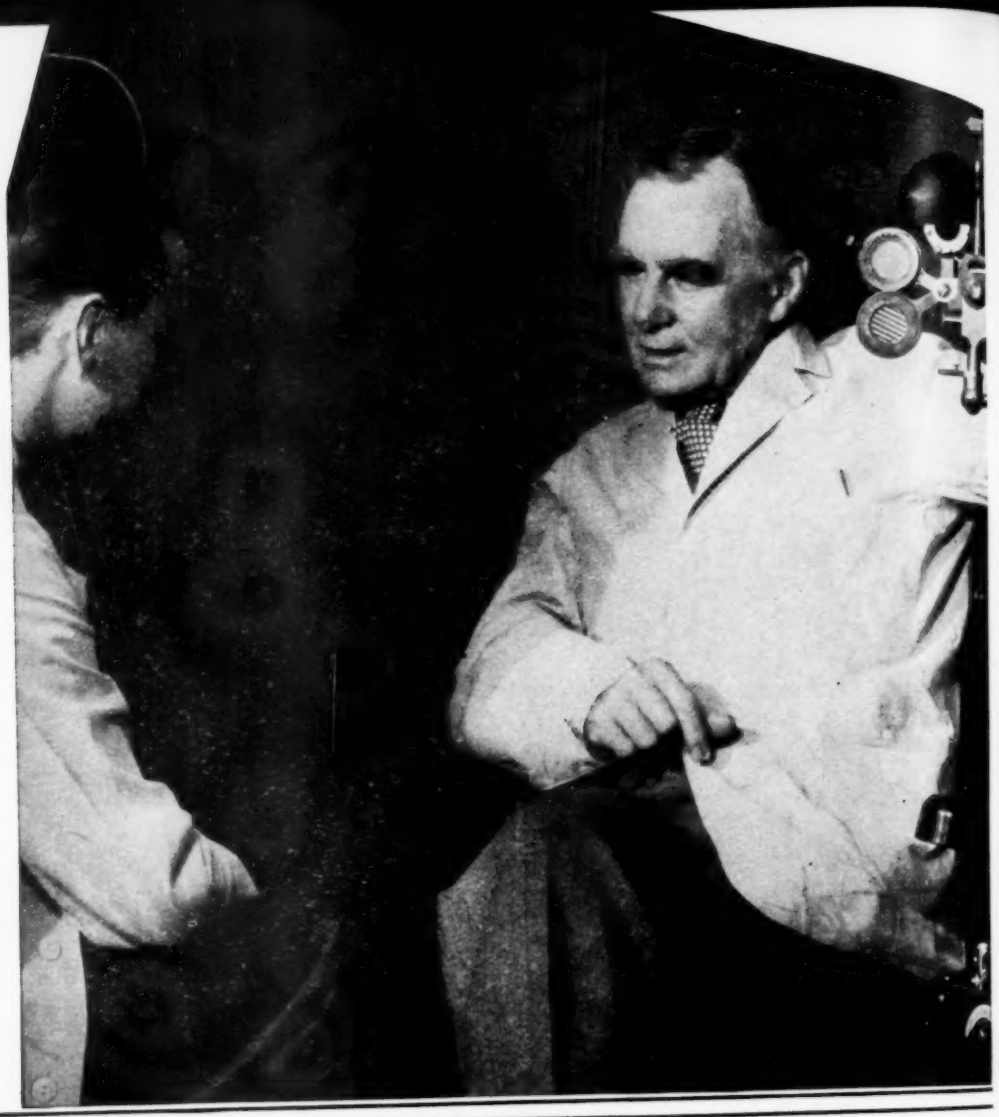

WHY ARE MORE SOFT-LITE BIFOCAL LENSES

AMERICAN JOURNAL OF OPTOMETRY

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CLINICAL DEVELOPMENTS AND OBSERVATIONS IN THE CORRECTION OF ANISEIKONIA*

Howard C. Doane, Opt.D., F.A.A.O.
Boston, Mass.

In the paper presented to the Academy at the meeting at Baltimore last year, I gave the results of my experience of approximately six months in the correction of Aniseikonia. During the past year, practically the same technique has been employed and few changes have been made in instrumentation.

Particular attention has been given to case history and the following procedure has been routine:

1. Visual acuity
2. External examination
3. Ophthalmoscope
4. Determination of Dioptric and Muscular conditions.
   A. Keratometer
   B. Skiametry—Static—Dynamic at 20'' and 40''.

Patient is then placed behind Ophthalmo-Eikonameter and careful adjustment of patient's head with reference to distance of vertex of cornea to lens system of instrument and correct centering of pupils to optical centers of lens systems.

   C. Distance tests, 20 feet.
   a. Simultaneous Binocular Vision
   b. Phorias
   c. Ametropia
   d. Phorias and fusional amplitudes

5. Determination and correction of Aniseikonia noting:
   a. Fixation disparity
   b. Eikonic effect of Ametropic corrections
   c. Variations in Eikonic conditions during tests
   d. Variations in Ametropic conditions during tests
   e. Tendency to poor fusion

*An abridgement of the material presented before the American Academy of Optometry at Cleveland, Ohio, December 16, 1934.

f. Tendency to suppression
g. Unsteadiness of Eikonic images
h. Evidence of Cyclophoria.

The above tests are repeated at Near —40 c.m. or 2.50 D. General consideration of the findings then determine whether a temporary prescription will be given on the form of a fit-over Iseikonic lens combined with the refractive correction or whether a final prescription may be given. In most cases a fit-over Rx is given for temporary use for at least a few days and sometimes two weeks. In such cases the refractive correction, together with Iseikonic correction is translated into such lens curves or form as to produce the same result when placed before the patient's eyes, as did the totality of the lens system in the Ophthalmo-Eikenometer. Sometimes this can be so translated as to require no fit-over, depending on the character and amount of the Aniseikonia.

On the above procedure I have prepared a report on one hundred and forty-one cases, representing the total number that have been given Iseikonic corrections up to November 1, 1934. This includes the cases reported last year. The reason for this inclusion is that the correlation of data has been arranged under different headings so that the report might correspond and be compared with similar reports by Drs. Madigan and Carleton, of their work in the Clinic at Hanover, N. H.

In presenting these data, let it be understood that it represents actual work done in routine practice, making application of technique developed by the group of scientists in the Department of Research in Physiological Optics of the Dartmouth Medical School. It does not represent experimental work on my part except insofar as it was necessary to vary or refine the technique to obtain definite findings in different types of individuals.

The cases examined for Aniseikonia were those

1. Referred by optometrists, physicians or others because previous refractions had not given relief.
2. Cases from our own practice that had not been relieved by previous refraction or exhibited symptoms that could not be attributed to the small amount of refractive error found.
3. Cases that had been given orthoptic training but had recurring symptoms and muscular anomalies.
4. New cases that exhibit Anisometropia, suppression; also those with symptoms more distressing than could be attributed to the amount of refractive error manifested. (On the latter, a thorough physical examination is required if it has not been recently done.

TABLE 1

Number of cases examined for Aniseikonia	370
Number of cases corrected for Aniseikonia	141
Number of corrected cases reporting relief	122
Number of corrected cases reporting partial relief	4
Number of corrected cases reporting no relief	15
Number of cases not corrected for Aniseikonia	229
Reason for not correcting—expense	46
Reason for not correcting—appearance	15
Reason for not correcting—uncertain—indefinite	48
Reason for not correcting—symptoms relieved by temporary refractive correction	120
Average amount of Aniseikonia found on uncorrected cases:	
Overall	.64%
Meridonial	.79%

The chief interest in Table 1 will center on "cases reporting no relief."

In the first place, the percentage of no relief or failure cases is surprisingly small. The reasons for failure may be enumerated as follows:

1. Faulty technique on part of examiner.
2. Uncertainty in decisions on part of patient.
3. Aversion on part of patient to appearance and weight of spectacles.
4. Lack of persistence in wearing correction to break down old conditioned reflexes and establish new.
5. At present time clinical work is confined to symmetrical Aniseikonia. There may exist a symmetrical or distorted Aniseikonia which at present is not measurable or correctable.
6. No opportunity has been given to modify or change correction given.

TABLE 2
Age of Patients
(141 Cases)

Years:	Between 10-20	20-30	30-40	40-50	50-60	60-70
	27	39	33	20	19	3
Average age					35.62	
Age of youngest patient					13	
Age of oldest patient					64	

In Table 2 the average age of 35.62 may indicate that symptoms of discomfort become more manifest after the individual has been subjected to the nervous demands of business or professional life. The younger individual has greater elasticity and, therefore, wider amplitudes and may not manifest ocular symptoms. But the wide attention on the

part of educators and psychologists to the importance of the vision faculty with reference to reading disability and behavior accounts for the large percentage of younger patients.

TABLE 3

Refractive Condition of Patients

(141 Cases)

Type	No.	Number with 1.50 D. or less	Number with Over 1.50 D.	Largest Amount	Average
Emmetropia	6				
Myopia, My-Astig.	46	26	20	—13. D.	—2.13 D.
Hyperopia, Hyp.-Astig.	71	50	21	+ 8. D.	+1.36 D.
Mixed Asig.	25	15	10	—1.25⌒+4. D.C.	—.75⌒+2.00 C.
Other eye Myop. / One eye Hyp.	3	2	1	R. —.75 L. +2.50⌒—5.50 D.C.	R. +.37 D. L. —.42 D.

Here in Table 3 I have grouped myopia and myopic-astigmatism in all cases where the sphere and cylinder would reduce to minus⌒minus.

Similarly with hyperopia and hyperopic astigmatism to plus⌒plus.

Hyperopes constitute approximately 50% of the total. 70% had refractive errors not over +1.50 D.

Myopes constitute about 32% of the total. 55% had errors not over 1.50 D.

The average refraction of the Myopes, —2.13 D., it will be noted, is higher than that of the Hyperopes, +1.36 D.

TABLE 4

Phoria—Horizontal

(141 Cases)

Type	Number at 20′	Number at 16″	Average at 20′	Average at 16″	Largest Amount at 20′	Largest Amount at 16″
Orthophoria	30	10				
Exophoria	65	105	1.66△D.	5.8△D.	11.△D.	18.△D.
Esophoria	46	26	1.7△D.	3.4△D.	8.△D.	12.△D.
Total	141	141				

	1.△D. or less	Above 1.△D.	Average	Largest
Hyperphoria	7	4	1.59△D.	4.△D.
Cyclophoria	5 Cases, not measured			

At 20 Ft.: Here it is noted that 43% were Exophoric while 32% were Esophoric but the comparatively large number of Orthophores, about 20%, might properly be classed as Esophores and thus Esophoria would predominate.

At 16″: As would be expected, Exophoria constitutes the larger group but it is significant that including Orthophores the Esophoric group constitutes 22%.

TABLE 5
Relation Between Refraction and Phoria at 20 Ft.
(141 Cases)

Type	Number	Ortho.	Exo.	Eso.
Emmetropia	6	3		3
Myopia My.-Astig.	46	10	20	16
Hyperopia Hyper.-Astig.	71	16	37	18
Mixed Astigmia	15	1	8	6
Hyperopia—one eye Myopia—other eye	3			3
	141	30	65	46

It is interesting in Table 5 to note that the Myopes manifest a slightly larger proportion of Esophoria, about 35%, than the Hyperopes, about 26%.

How these percentages would compare with a similar number of Iseikonic cases has not been determined. This will be studied later.

TABLE 6
General Symptoms of Patients
(141 Cases)

Headaches	92—65.00%	
Stomach Disturbances	17—12.70%	
Dizziness	20—14.00%	
Nervous	32—22.70%	31%
Tension	12— .84%	
Suppression	21—14.00%	
Migraine	4	

In Table 6 headaches have not been classified as to type, location or character, as this is a study in itself but this general symptom of course predominates.

Nervousness and feeling of tension might be grouped as one classification and if this is done, it is interesting to find that the proportion of 31% compares closely with the 32% of Esophores. (Table No. 4.)

As will be shown later, there is evidence that in Esophoric cases the amount is reduced and even changed to Exophoria after correction of Aniseikonia.

It would seem, therefore, that nervousness or tension as a general symptom might be "characteristic."

Further study is necessary.

TABLE 7

Ocular Symptoms of Patients

(141 Cases)

Photophobia	64
Eyes tire (general)	84
Eyes burn and ache	34
Eyes blur	66
Eyes tire at near	109
Eyes tire at movies	96
Eyes feel drawn	65
Fatigue—Auto or train	24

The study of symptoms, Table 7, either general or ocular is for the purpose of establishing characteristic symptoms. This is far from complete or conclusive but in general the evidence points to Photophobia: eye fatigue at movies and in auto or train.

Fatigue in use of eyes at near is of course the ocular symptom most generally encountered and while it may not be characteristic, there have been cases of Emmetropia with Aniseikonia where the correction of the Aniseikonia has relieved the symptom. For the present then let us classify characteristic symptoms as follows: General, Headaches and Nervousness; Ocular, Photophobia and Eye Fatigue.

TABLE 8

Duration of Symptoms

(141 Cases)

Years:	1 or less	1-5	5-10	10-20	20-30	30-40	40-50
	2	57	40	27	7	7	1

Table 8 indicates that a more complete study should be made of "Onset" and "Duration of Symptoms."

TABLE 9

Aniseikonia—Type and Amount

(141 Cases)

Type	No.	Smallest	Largest	Average
Overall	28	.50%	3. %	1.10%
Meridional	86	.50%	4.50%	1.50%
Overall-Meridional	27	50% 0-75% M.	2.% 0-2.50% M.	.92% 0-1.29% M.

A study of normals—that is people who manifest no ocular trouble of any sort—was made at Hanover, which showed that the average amount of Aniseikonia was 53%. This offers a means of comparison with figures of table 9 which shows an average of the three groups to be

1.23%. This average is about the same as reported last year and compares with the reports of Drs. Madigan and Carleton previously made.*

TABLE 10
Aniseikonia with Equal Ametropia
(141 Cases)

Type	No.	Refractive Errors Smallest	Largest	Average	Aniseikonia Smallest	Largest	Average
Overall	4	+.37D.	—2.00	1.12D.	.75%O.	1.25%O.	1 %O.
Meridional	21	—.25D.	+2.50	.87D.	.75%M.	2.50%M.	1.20%M.
Overall-Meridional	5	+.50D	+1.75D.	1.00D.	.50%O. .75%M.	1. %O. 2.50%M.	.55%O. 1.40%M.
Total	30						

TABLE 11
Aniseikonia with Anisometropia

Type	No.	Diff. in Refractive Errors Smallest	Largest	Average	Aniseikonia Smallest	Largest	Average
Overall	24	.25D.	3. D.	.75D.	50%O.	3.%O.	1%O
Meridional	65	.25D.	4. D.	.92D.	50%M.	4.50%M.	1.26%M.
Over-Meridional	22	.62D.	4.50D.	1.08D.	50% 0:75M	2% 0:2.50%M.	.63% 0:1.18%M.
Total	111						

A comparison of tables 10 and 11 shows a most interesting fact. The average amount of Aniseikonia (three types) is almost equal in the two classes. Overall 1% in table No. 10 against 1% in Table No. 11. Meridional 1.20% in Table No. 10 against 1.26% in Table No. 11. Overall-Meridional 1.05% in Table No. 10 against 1.02% in Table No. 11.

TABLE 12
Aniseikonia with Emmetropia

Type	No.	Amount of Aniseikonia Smallest	Largest	Average
Overall	4	.50%	1 %	.74%
Meridional	2	.75%	1.50%	1.11%

TABLE 13
Length of Time Iseikonic Corrections Have Been Worn
(141 Cases)

Months 1-3	3-6	6-9	9-12	12 or more	Total
22	21	21	24	53	141

*Annals of the Distinguished Service Foundation of Optometry, 1932.

TABLE 14

Effect of Correction of Aniseikonia on Phorias and Fusional Amplitudes

Report on 38 cases.

Exophoria 20 Ft., Greater Exophoria at 16''	9
Exophoria 20 Ft., Esophoria at 16''	6
Esophoria 20 Ft., Greater Esophoria at 16''	8
Orthophoria 20 Ft., Exophoria at 16''	10
Orthophoria 20 Ft., Esophoria at 16''	5
	38
Low Positive Fusional Reserve	19
Low Negative Fusional Reserve	19
	38
Showing less Exophoria at 16''	12
Showing less Esophoria at 16''	10
Showing change from Eso. to Exo. at 16''	8
Showing improved P. F. R.	14
Showing improved N. F. R.	12
Showing no change in phoria	8
Showing no change in F. R.	12

Opportunity to make complete analysis (Table 14) of the relation of Phorias and Fusional reserves before and after correction of Aniseikonia has been difficult and this line of investigation has not been carried over a long enough period to be of more than passing value. Special study of these factors is now being carried on and valuable data will be forthcoming.

While the improvement shown in the cases I have reported may be due to the cumulative effect of refractive correction and Aniseikonic correction, there were four cases that have previously had orthoptic training and refractive correction but trouble was not relieved.

On six of the above cases, I gave fusion orthoptics before satisfactory measurements could be obtained. In all these cases improvement was noted in fusional amplitudes.

There has not been sufficient elapsed time since corrections were given to report the permanency of corrections but from evidence available it would seem that the type of Aniseikonia does not change.

Conclusions

The foregoing report confirms the report of last year—

A. That the existence of Aniseikonia may be the cause of ocular

and general symptoms of discomfort.

B. That the correction of Aniseikonia has afforded definite relief in a large per cent of corrected cases.

C. That the prevalence of this condition and its relation to visual and general comfort is greater than is generally realized.

D. That Aniseikonia exists with Emmetropia and that while the larger number of cases may be found with Anisisometropia it does exist with equal ametropia.

E. That the type and amount of refractive error is no criterion of the type and amount of Aniseikonia that may be preesnt.

Illustrative Cases

EQUAL AMETROPIA

Mr. P. A. C., investigator, age 54, No. 11961. Drives car every day, long distances. Symptoms: Marked eye fatigue. Photophobia. Daily headaches.

Rx.: R. +1.50 ⌒ —.25 Cyl. Ax. 90⌒ 1% M. Ax. 180
L. + 1.50 ⌒ —.25 Cyl. Ax. 90

Near: Add O.U. +1.75.

Reports immediate relief and continued comfort.

This case exhibited no abnormal muscular data. Fusion good. Stereopsis not good.

Positive and negative fusional reserve good.

Symptoms *had continued* over many years. Previous refraction had given only partial or temporary relief.

ANISOMETROPIA

Miss J. F., art student, age 18, No. 10960.

Symptoms: Extremely nervous, irritable, headaches. Eyes blur, photophobia. Would not wear former corrections.

Rx.: R. —3.75 Sph.⌒50% Overall⌒2% M. Ax. 90
L. — .75 Sph.⌒—1.25 Cyl. Ax. 180

Reports great improvement. Enjoys her work. Parents report marked changes in disposition.

Various refractive corrections given had not given relief. Esophoric with low negative fusional reserve. Orthoptics had been given without lasting results.

EMMETROPIA

Miss B. G., Student, age 17, No. 16575.

Symptoms: Reading disability; hesitates, repeats and stumbles in reading. Photophobia, lacrimation. Infrequent headaches after study. Glasses prescribed in 1928; no help, discontinued. Unusually good health record. Painstaking objective and subjective examination revealed no

refractive error or muscular anomalie except Positive and Negative fusional reserves low but equally so.

Aniseikonia was positively demonstrated:
O.D. image larger than O.S. in vertical meridian.
O.D. image smaller than O.S. in horizontal meridian.
Following Iseikonic prescription was given:

November 18, 1933

O.D. 1.50% M. Axis 90
O.S. .50% M. Axis 180

Jan. 3, 1934: Parents and teacher report marked improvement in studies. Reads more accurately and rapidly.

June, 1934: Finished school with much better marks than formerly and comfort continues. Re-examination showed improvement in fusional reserves. No refractive error manifest.

DR. HOWARD C. DOANE
59 TEMPLE PLACE
BOSTON, MASS.

DISCUSSION

DR. NUEMUELLER: Permit me to say that Dr. Doane is at present the only optometrist practicing on aniseikonia. I know it is the opinion of Dartmouth, as well as my own, that he is by far doing the most acceptable work. His reports are of real value, because they depict, not the conditions in a clinic of the research type as at Dartmouth, but the conditions which we have found to exist in the field. At the New York University Dr. Hughes and Dr. Fisher are in charge, and they have found the same characteristics that Dr. Doane has reported. One very outstanding phase contained in reports of Dr. Hughes is that anisometropic cases do not always give us size differences. It is quite tempting to think of aniseikonia in terms of optics, but we can not think only in terms of optics.

Possibly you would like to hear what the next steps at Dartmouth will be. The department has been trying for the last year to devise an apparatus to obtain a summation of aniseikonic influences. For this purpose a tilting table has been constructed.

This apparatus consists of a fixed horizontal platform about five feet square into which is cut an aperture of about three feet square. Through this aperture can be seen the tilting table which by means of ropes and pulleys can be tilted laterally and horizontally. On the tilting table are brass shavings of other irregular objects to induce and hold fusion. The view of one eye of the observer is unobstructed so that he can see with this eye the horizontal fixed platform and through the square aperture the tilting table. The field of view of the other eye is limited by means of a square opening cut into a metal shield so that this eye can only see the central part of the tilting table, but no contours of

the fixed horizontal platform. Therefore, the subject sees monocularly the entire apparatus and binocularly the central part of the tilting table. The subject is requested to set the tilting table parallel to the fixed horizontal platform. The angular deviation from the horizontal position is a direct measure for the existing aniseikonia in the 180th meridian. The fore and aft tilting is indicative of the declination between corresponding retinal meridians. If a size difference axis 90° is introduced before one eye the subject sets the table as if half of this size difference were introduced horizontally before the other eye. A compensation of some kind undoubtdly takes place and it is the endeavor of the department to run down the source of this compensation. The experimental data from the tilting table encourage the belief that a rather simplified apparatus for the detection and general rough determination of aniseikonia can be built.

Frequently the question is asked if squint can be cured by means of iseikonic lenses. Undoubtedly aniseikonia in a patient endowed with poor fusion faculty can produce squint. At the same time, it would be a great error to state that the cause of any squint is aniseikonia. One very interesting and successful case may be worth mentioning. A young man from Central America, 24 years old had a fall when a boy of eleven years, and ever since suffered from alternating squint with diplopia. Two operations performed in Central America and three more operations performed in New York did not bring the desired result. Any change in the position of the patient's head produced a different kind of tropia. The young man was referred to Dartmouth from New York. After many hours of painstaking examination the iseikonic clinic arrived at a hyperopic prescription with eight per cent overall and seven per cent meridional size lenses. The patient has now single binocular vision throughout his entire field of view with any head position and almost perfect stereopsis.

DR. HALL: Regarding the measurements on this squint case, what technique was used

DR. NEUMUELLER: To the patient's monocular view were presented alternately, squares and by his answers was ascertained which eye needed the size lens. Thus the ocular images were approximately equalized although one appeared to be rotated against the other. This rotational effect was removed by turning and changing the amount of the meridional size lens. Under these conditions the patient would get single binocular fixation for a small central field with a certain head position. Then a head band was provided for the patient which head band carried on the front two flash lights. One of these flash lights was focused on a vertical screen facing the patient, and the other on a vertical screen at the side of the patient. Thus the position of the head could be accurately recorded. By changing the amount and rotation of the size lenses the head was finally brought into a straight position. The binocular fusion area increased by this procedure. Finally, the patient could be taken to the eikonometer and examination finished.

DR. WILLIAM TAIT: I am particularly interested in the increase in reserves. I should like to ask Dr. Doane the conditions under which the phorias were taken before and after the prescription of these iseikonic lenses.

DR. DOANE: First the phorias are taken at the beginning of the examination. They are the original phorias, with or without prescription. Then, after the refraction is made on the eikonometer and before the iseikonia is corrected a record is again made of the phorias. After the test for aniseikonia is completed and the iseikonic correction applied, the phorias are again checked. There are many cases that have shown immediate change in the phorias after the iseikonia correction is on.

I have records here of cases that have reported some months after having worn their correction, and the phorias have, in some cases, changed. Some showed a lesser amount of exophoria, or even shifted from esophoria to exophoria at 16 inches. Of course that may be accumulative with a refractive correction as well as with the iseikonic correction; there is no way of determining that execpt by the past history of a case.

DR. WISEMAN: You say out of 370 patients examined. Did you find aniseikonia in all patients?

DR. DOANE: I reported that of the patients examined over 70% showed aniseikonia.

DR. EDWIN TAIT: I should like to ask Dr. Doane if he has noticed changes in aniseikonia in the same individual over a space of time which could not be ascribed to anatomical variations?

If, for instance, an individual presents the two per cent difference now and in a year presents a one per cent difference or a three per cent difference, and those changes seem to be definite enough, it would seem to indicate that there might be a certain learning aspect connected with this matter of single binocular vision, and if that is true then we should have to discard very definitely the idea of mechancial incidence.

DR. DOANE: In answer I might say, that I have had within a few months, several cases that were previously examined and corrected at Hanover. In these and other cases the aniseikonia has changed very little. The changes which were evident may have been due to some difficulties in obtaining the previous correction. It is extremely difficult to determine which eye would most readily accept the correction for the aniseikonia, yet it matters somewhat just how the correction is applied.

DR. EDWIN TAIT: Another thing I would like to know very much is, what is the maximum clinical error with a reasonably intelligent patient?

DR. DOANE: That involves a time element. In the actual procedure, the patient, at first, is rather indefinite. The lights in relation to the dots are not steady, but as you proceed with the correction the

patient becomes much more definite in his responses. Now, the smallest amount would be perhaps a quarter of one per cent. Many cases will correct or determine differences as low as 25 one hundredths of one per cent, and the largest amount would have to be determined by averages or by the amount of amplitude. They will tolerate a size difference either over-all or meridional up to a very marked degree, sometimes 4 per cent, and they will go back to minus one per cent showing that there is a factor of tolerance, or amplitude. One-half of one per cent, however, would probably represent the maximum clinical error in the determination under normal conditions.

A NEW SUB-NORMAL VISION APPLIANCE*

Edwin Forbes Tait, Ph.D., and John Collins Neill, O.D.†
Philadelphia, Pa.

Due principally to the work of Feinbloom[1] there has been, during the last few years, a considerably increased interest in the problems of sub-normal vision correction.

For the most part the medium of correction in such cases has been the Galilean telescopic spectacle developed by vonRohr although occasionally other subnormal vision aids such as stenopaic or multiple pinhole discs or the Feinbloom[2] microscopic spectacles and cylindrical telescopes have been used.

Although these telescopic appliances have proved their practicability and usefulness, especially in making near work and reading possible in many cases where ordinary glasses were not helpful, many difficulties, arising principally from two sources, have been encountered in their use.

The first of these major difficulties is that of the shift in the apparent position of objects toward the patient which is an unavoidable feature of any telescopic system. While this is rarely objectionable at near, it forms, in most cases, an unsurmountable obstacle in the use of the usual type of telescopic spectacle for distance, especially when walking.

An interesting and fairly successful attempt at reducing the inaccuracy of distance judgment when using a vonRohr type of telescope has been introduced by Feinbloom[3] in the shape of a sphero-cylindrical telescope in which, by introducing a deliberate distortion and reducing the magnification in one meridian, he has succeeded in referring the whole image more to the plant of unity. While this device eliminates to some

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*An abridgment of the material presented before the American Academy of Optometry at Cleveland, Ohio, December 16, 1934.

†The authors wish to acknowledge the kind help of Dr. Joseph B. Deissler who developed the methods of grinding the telescopic oculars and supervised the manufacture of the experimental spectacles.

1. Application of Telescopic Spectacles to Refraction; Transactions of the American Academy of Optometry, Vol. 4, 1929, pp. 74-89.

2. Report of 500 Cases of Sub-normal Vision, Transactions of the American Academy of Optometry, Vol. 8, 1934, pp. 58-69.

3. A New Type of Sub-normal Vision Lens; Transactions of the American Academy of Optometry, Vol. 7, 1932, pp. 207-224.

extent the difficulty caused by the apparent displacement of object of regard toward the patient, it does not help in any way the problem of the limitation in visual fields.

This latter, the second of the difficulties, is introduced by the comparatively limited field of the usual telescope which restricts the visual field to from 22° to 35° according to the type and optical characteristics of the appliance.

Considerable study has also been given to the problem of widening the useful field of vision of these devices by refinements of design, but the actual practical limits of improvement by such methods have probably been reached.

So far, therefore, a telescopic unit of the vonRohr type has not been produced which would overcome these two faults of limited field and the apparent displacement of distance objects.

In the writers' experience with sub-normal vision cases, many patients have been encountered who, without glasses or with an ordinary correcting lense, have little or no difficulty in walking, or in any activity not involving clear central perception. In these cases, the ordinary type of telescope gives excellent results as far as the considerably reduced central visual acuity was concerned, but usually proves to be impractical for use at distance, and, in addition, is often objected to as being rather heavy and unsightly.

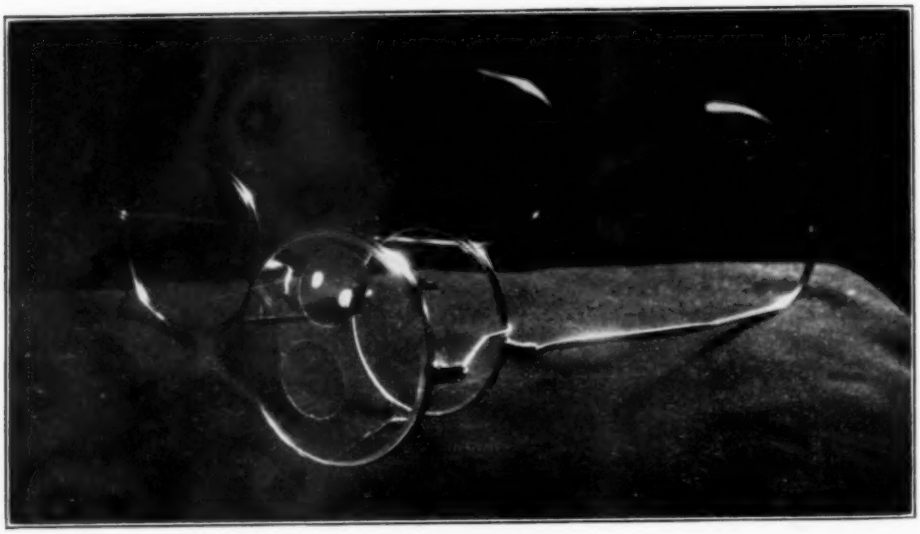
Experiments with some of these patients demonstrated quite conconclusively that for efficient use of the central visual field the 22° to 35° field of the vonRohr telescope was not necessary, as the patient, in practically all cases, was able to read fully as well when the field was reduced to as little as 10° by pasting a paper ring on the objective lens of the telescope.

With these facts in mind the authors set about designing a telescopic spectacle system wherein there would be little or no interference with the normal form field but which would incorporate one or two, or more, small telescopic systems so designed as to make it possible to use them at will for fixation for distance or near, or for occupational use.

Many years of experience by the authors in the adaptation of bifocals in presbyopic cases have demonstrated to them that the great majority of patients will, in a short time, become used to the presence of the bifocal segment in the indirect field of vision and will be no longer aware of its presence, the difference in the focal length of the distance lens and of the bifocal creating no uncertainty in judging distance. In view of the much larger area not covered by the segment, the usual psychological process of suppression of attention in small area is initiated and very soon no attention whatever is given the segment area when not using it.

It is believed by the authors that this same phenomenon would be present if the bifocal areas were supplanted by telescopic systems, even if

Sub-Normal Vision Appliance—Tait & Neill



two or more systems were used, as long as the major portion of the area of the base lense, and especially that of the extreme peripheral portion, was not included in the area devoted to the telescope. On this basis, therefore, the authors have designed and have had built a number of telescopic spectacles which each consist of two or more small telescopic systems arranged upon base lenses in such a manner that the patient can use them at will. Care was taken to keep the central portion of the base lens free and to occupy with the systems only a small area of the total peripheral field of the spectacles.

The spectacle, in its most recent form consists of a correction lens, ground to the ametropic correction of the patient but having its curves so designed as to permit countersinking with the proper concave curves to provide fairly flat fields when used as telescopic oculars.

A large but thin lens, with surfaces as nearly as possible concentric with the center of rotation of the eye, is mounted at the proper distance in front of the ocular base lens. Designed to give no refractive power at distance its only function is to afford a base for the mounting of the telescopic objectives which again are ground so as to provide the flattest possible field for the given magnification and aperture.

So far, a number of these spectacles have been constructed varying in magnification from 1.7x to 2.5x.

While the practical number of telescopic systems in any one spectacle probably is limited to four or five, two, one each for distance and near, have been found most useful in clinical application.

It should also be noted that even though in selected cases the newly developed spectacle permits constant wear with little or no uncertainty in locomotion or judgment of distance, the same process of visual re-education is found necessary as when prescribing the vonRohr telescopes.

Summary

1. A new type of telescopic spectacle embodying multiple telescopic systems, is presented by the authors.

2. Because, like bifocals, the telescopic systems cover only a limited area in the whole indirect field, they come to be disregarded by the patient except when used deliberately and in most cases can therefore be worn constantly with comfort and efficiency.

3. The design permits of fairly high magnifications, from 1.7x to 2.5x, with fairly large and flat fields.

4. The spectacles are useful principally in cases where the peripheral vision is fairly good but where central visual acuity is poor but capable of improvement with enlarged retinal images.

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DISCUSSION

DR. JAECKLE: When Dr. Tait spoke of the application of the bifocal idea to sub-normal vision I thought of our experiences in cases that we have handled. In the case that I reported here last year you may remember that the patient had had no useful vision prior to the time that he started working with me, so that he had no experience in interpreting any visual impressions. Such impressions as he received were useless. He had never attempted to interpret them until we started to work with him, so we found that it was possible for him to learn to walk about with a telescope of 2.2x type without any difficulty in judging distances.

However, we did find, after he had them for a while, that he was sometimes looking at things outside of the glasses. He would look off the side here, and we believe that his vision would improve more rapidly if he were obliged to look through the glasses so that he would always get the most favorable type of images; so we put a side shield on the glasses, but we found that he really wanted that little bit of field off here when he was outdoors. The side shield was fine indoors.

He said, "I am glad to have it, because it makes me look through the glasses when I am indoors and want to look at things more or less sharply, but outdoors I do not have to see things so sharply. I am not using them, and it helps me more if I can see things off the side to walk around." That experience of field difficulties is one that we have all had.

Then I recall another case of a patient who had good vision and lost it, and so could not use these spherical telescopes for walking about, but who had, nevertheless, attempted to move about the room with spherical telescopes on because that was all that we had to give him up to that time. Subsequently we provided a wide angle telescope and he reported that he could move about better. They were both spherical telescopes and the wide angle had a lower magnification and would introduce a lesser error of distance judgment.

He could move about better with the first pair with his reading glasses because he could see off to the side: and even though the second pair had a wide angle he really did not need that angle for moving about. What he needed was a wider angle regardless of vision.

I have had some cases where people wanted to have improved vision just for a few moments. Women have spoken of the desire to see the price on price tags when they go shopping, and both men and women patients have reported a desire just to be able to see something on a theatre program or something on the menu, perhaps it was the price again, I do not know. There seems to be a real need for a device of this type which would enable patients to get some assistance just for a brief period of time when they need it without, as someone remarked, taking a pair of telescopic spectacles out of a case and putting them on, and then putting them away again.

We have attempted to get around that in some cases where the vision was not too low by supplying an extra addition in the monocular fit, all to be placed over the spectacles, but obviously if the vision is very poor that is not going to give sufficient improvement in the acuity to meet the needs, where this device will.

I believe that we should find some very practical uses for the type of device that Dr. Tait has presented to us this afternoon. I was also interested in the fact that two telescopic systems are incorporated in one device without making any changes. Patients have remarked the need for that, and you can imagine if we tried to dodge that question what would happen, because one of the elements in successful treatment of sub-normal vision is to keep the patient's mind off the difficulties that we cannot do anything about; not that we try to deceive them in any way, but, after all, we feel that if we take a patient who has not been able to read anything and enable him to read he should appreciate that for a while, and wait until Dr. Tait develops something like this in sub-normal vision.

Dr. Tait says he has one with four systems. I do not doubt that he will find the patient able to use it, too. I would be interested in having Dr. Tait tell us of some of the applications of these devices, and some of the uses to which patients put them, and their reactions to them. I wonder what the reaction is to the appearance of these glasses. These are less conspicuous than the ordinary telescopic spectacles, but yet they are more conspicuous than ordinary glasses; and I wonder just how much the patient observes that and to what extent they react to it.

DR. TAIT: We have not used enough of the appliances to get any real reactions. The cases where we have used them are selected cases that would be willing to wear anything to see. For instance, I have a young woman patient at the present time who is a congenital cataract case operated on some years ago. She has a very low visual acuity, and had been getting along for ordinary reading with a 2.2x spherical telescope with about +6. add, which made it possible for her to read ordinary type; but her difficulty was music. She wanted to read music at about 16 inches and play at the same time, which was an extremely difficult thing for her to do, because the ordinary sized music on a music stand or piano could not be brought out very well with the usual telescopic system. The device reported in this paper will probably solve her difficulty. With telescopes, she has to use a great many head movements in order to keep sufficiently in advance of the music.

The lack of a wide field handicapped her somewhat, but she found she was able to make a readjustment to that with some difficulty.

DR. JAECKLE: I would imagine that patients would be quite willing to use this device, from my experience with telescopic spectacles, generally; and I think they would appreciate improvement in the appearance if that is a factor. I would like to remark that it has been my experience that sub-normal vision patients do not raise the question of appearance very much.

VARIATIONS IN VISUAL ACUITY WITH VARIOUS ABSORPTION LENSES*

Julius Neumueller, B.S., O.D., F.A.A.O.
Philadelphia, Pa.

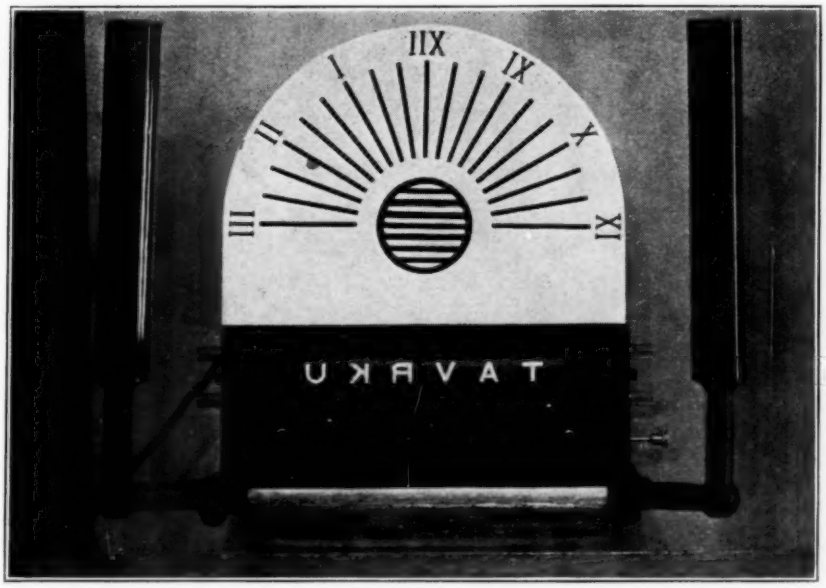
The purpose of this investigation was to determine by subjective clinical methods the gross influence exerted by absorption lenses (commonly called tinted lenses) upon the visual acuity.

It is evident that visual acuity with absorption lenses cannot be a purely theoretical function of the transmitted visible spectrum and the retinal sensitivity curve, as the different transmission of the various wave lengths will tend to either intensify or reduce the chromatic aberration of the human eye. The change in pupil size under the influence of the absorption lenses will also have a bearing upon the V. A. and besides the high point of the retinal sensitivity curve being different for different individuals, their V. A. will probably be differently affected by the same absorption lenses.

For the purpose of the test various charts were designed. A chart for twenty feet with conventional test letters ranging in size from 20/40 to 20/10 in steps of 20/05. A similar chart was designed for outside use at one hundred feet distance. It was intended to use for the indoor investigation three illumination levels of 0.5 F.C., 6 F.C., and 20 F.C. and to make two outside tests, one on a cloudy and one on a clear day. Engagements in other research at the Dartmouth Medical School have prevented for the present time the execution of this plan. Besides, a cursory investigation has shown, that absorption lenses of light and medium tint effect the visual acuity to such a small extent that discriminating data could not be expected by means of the above described charts.

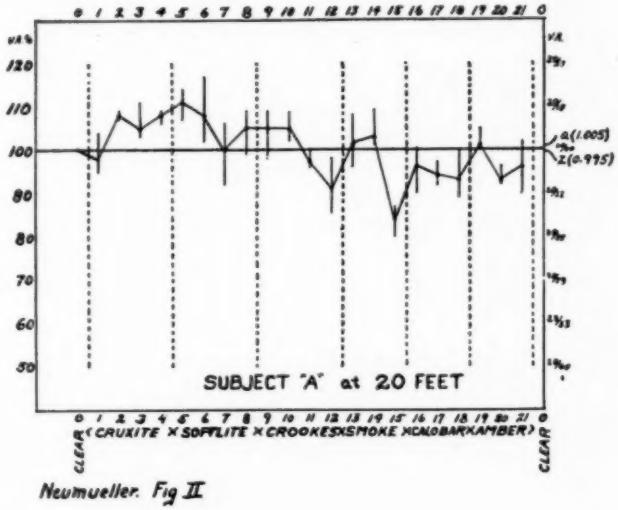
The glasses used for the test were ground with plano power on plus 6 B.C. and 2 mm. thick, and mounted in snap-ons. Besides these 21 pairs of absorption lenses there was also available one empty spectacle frame and one spectacle carrying clear lenses of plano power ground on plus 6 B.C. and 2 mm. thickness. The procedure of using these lenses was to test all non-spectacle wearing subjects first with plano clear lenses and then with the empty frame carrying the snap-ons. The spectacle wearers among the subjects were tested first with their spectacles and

*An abridgment of the material presented before the American Academy of Optometry at Cleveland, Ohio, December 17, 1934.

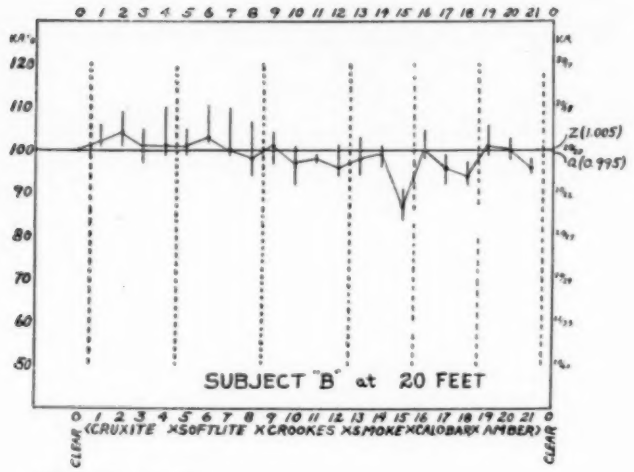


Neumueller. Fig. 1.

the clear glass plano spectacles superimposed and then with their spectacles plus the various snap-ons. Thus it was assured that each subject faced for all tests the same glass thickness and the same number of glass surfaces. The power of each test lens was measured on the diopto-eikono-



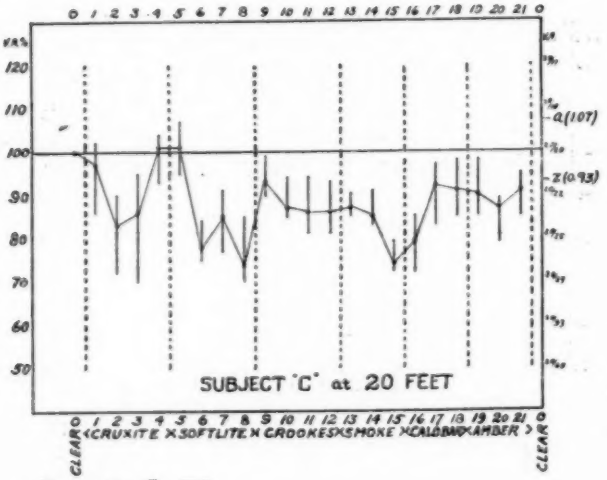
Neumueller. Fig II



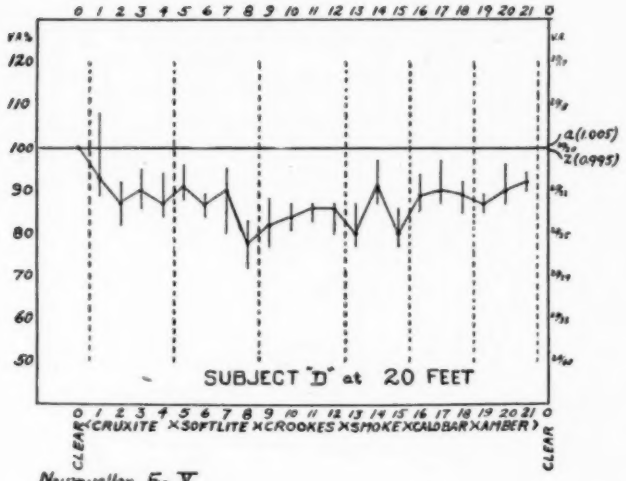
Neumueller Fig III

meter, an instrument used to measure the power and magnification of iseikonic spectacles. The greatest deviation from plano was found to be .05 D. All lens thicknesses were ground to 2 mm. within +.10 mm. Table No. 1 enumerates the test lenses and their deviation from the 2 mm. thickness and plano power.

As the test chart was finally chosen the Ives Acuity meter and as test object the astigmatic adjustable lines set at 180°. The test was

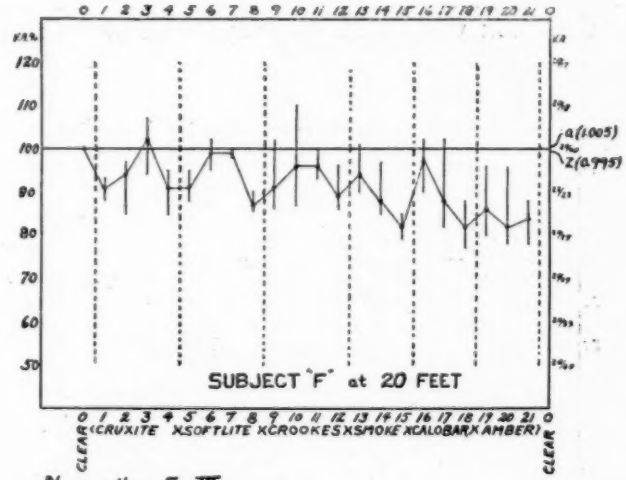


Neumueller Fig IV



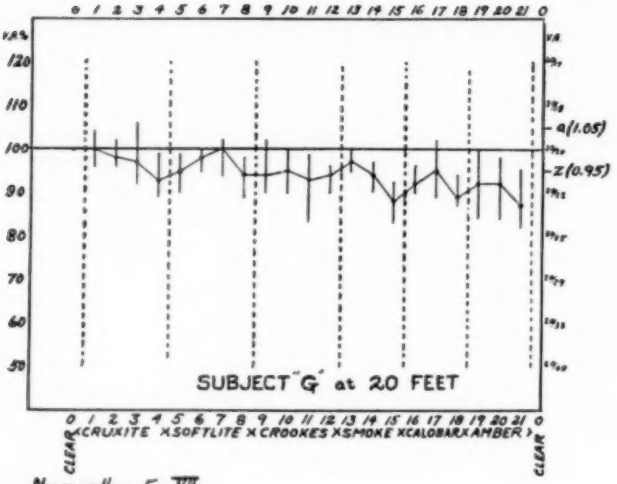
Neumueller Fig. V.

performed at a distance of 6 M binocularly at night time. The front face of the instrument was illuminated. By means of the adjustment screw the lines were brought so close as to become indiscernable for the subject. Then the space between the lines and the thickness of the lines were increased by means of the adjustment screw until the subject gave the signal that he or she could distinguish lines.* Five readings were



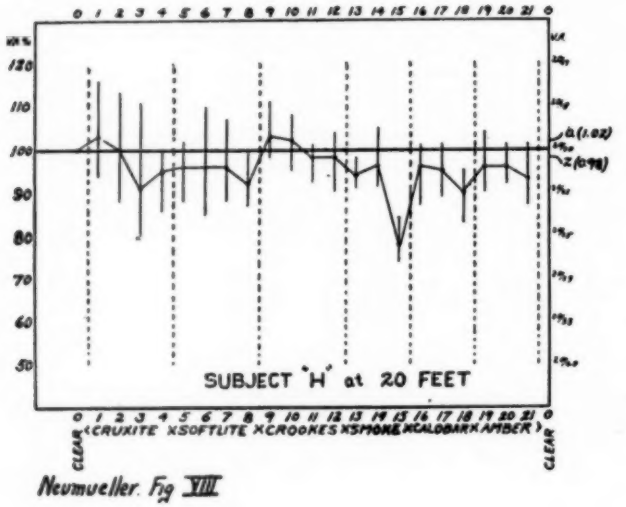
Neumueller Fig VI.

*At the beginning of the test the recognition point and the vanishing point was determined. The vanishing point, contrary to all expectations occurred at much lower V. A. and besides the data for this point were so inconsistent as to make them valueless. Therefore the taking of the vanishing point was discontinued.

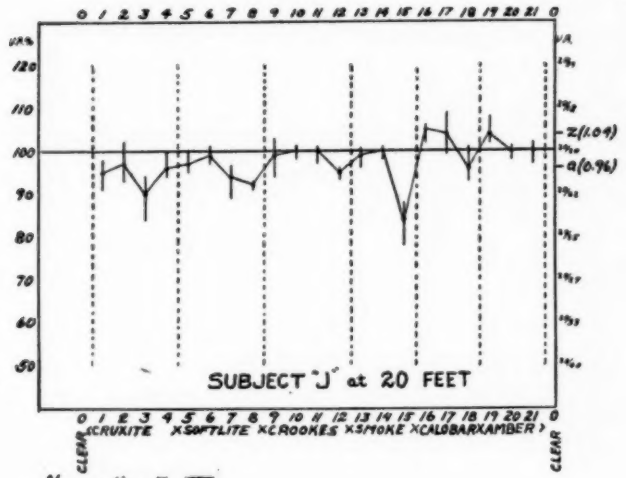


Neumueller. Fig VII

taken for this recognition point with each absorption lens and each subject. For the clear glass five readings were taken at the beginning and at the end of the test. The arithmetical means of these clear glass readings are designated as "a" and "z" on the diagrams. All readings were then reduced in proportion to the average of the ten clear glass readings which was taken as 1.00. The scattering of the readings is indicated by the black vertical line through each average point. Finally



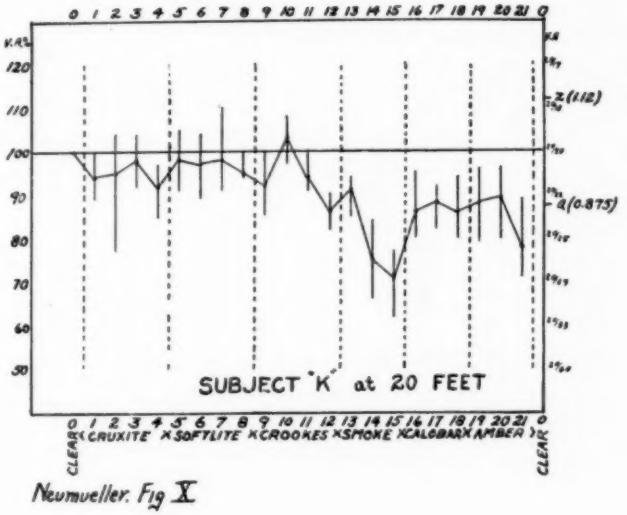
Neumueller. Fig VIII



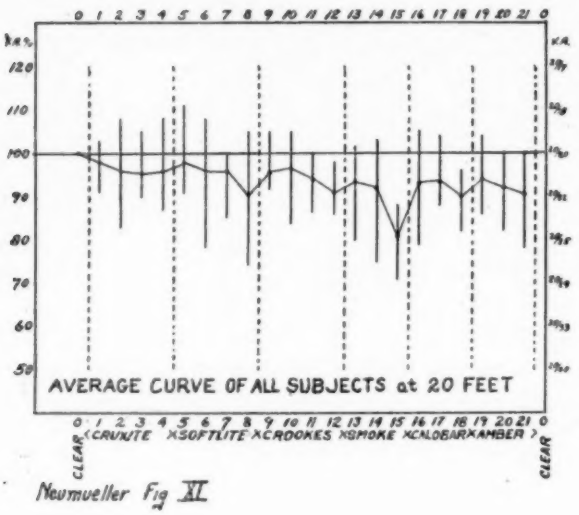
Neumueller Fig IX

the mean value of all individual average points was computed and combined in a diagram.

The scattering of the readings for the various subjects shows a great variance. To explain this we have to consider that in cases where the initial V. A. of the subject was below 20/20 (100%) a reduction of the data to 20/20 (100%) unduly elongates the line indicating the scattering. Two of the subjects wore glasses which purposely overcorrected their manifest hyperopia thus reducing their distance V. A.



Neumueller. Fig X



Neumueller Fig XI

materially. In these cases the scattering of the readings is exaggerated when their subnormal V. A. taken with their correction lens plus the clear glass plano spectacles is considered as 100%.

Subject "C" wears No. 8 shade incorporated in his correction. This prescription was duplicated with clear glass trial case lenses and then the various shades superimposed. Strange to say with the No. 8 lens he registered the lowest V. A. We simply mention this incident without any suggestion of an explanation or theory, being aware of the fact that one such case does not permit any conclusion.

Two subjects tested are not included in this report because both evidenced a decisive learning function during the test. The "z" reading, which is the mean of the 5 readings with clear glass after the conclusion of the test, was about 20% higher than the average of the 5 clear glass readings at the beginning of the test (a). Subject "C" shows the contrary condition the "z" reading being about 14% less than the "a" reading which condition is probably due to fatigue.

The truth of the information gained by the investigation cannot be denied. With very few exceptions we find that the average values are within the middle third of the scattering and that therefore the readings follow the general character of data curves for physiological functions. The scattering is to be explained by the variations of the subject's judgment, retinal fatigue, disturbing after images and also the learning of the test. If we however consider that 80% V. A. is equivalent to 20/25 V. A. then we arrive at definite conclusions. We see then very plainly that light and medium shades of absorption lenses do practically not effect the V. A. Even a rather heavily tinted absorption lens does not materially lower the V. A. under average illumination.

From the affective standpoint, when asked about the pleasantness of the shades áll subjects agreed that the amber shades are the most unpleasant ones of all. Greenish shades were generally describd as most pleasant. The neutral shades did not offer enough contrast for judgment.

We feel indebted to the department of research of Physiological Optics at the Dartmouth Medical School and to Dr. C. A. Proctor for the equipment and active interest in this investigation. As our work with this problem has shown that only very small V. A. differences are introduced by absorption lenses, we therefore intend in the year 1935 to test for retinal resolving power with absorption lenses under more strictly controlled conditions.

Conclusions

Light and medium shades of commercial absorption lenses can be worn by the average patient without any marked effect upon his V. A.

The selection of these lenses for prescriptions can therefore only be based upon their possible physiological advantages derived from their absorption in the ultra-violet and infra-red regions.

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PHILADELPHIA, PA.

DISCUSSION

DR. CARLSON: Dr. Neumueller, how do you reconcile your findings in the light shade tints with the fact that many of our patients report that when we add to their distance correction a number one or two, soft-lite, or cruxite lenses that they see clearer, yet all your diagrams show that the visual acuity lessens.

DR. NEUMUELLER: Not all subjects have reported less V.A. with absorption lenses. About half the subjects reported better V.A. under test. In all cases, except with deep shades, the change in V.A. was so small as to fall within the error zone of the test.

The patient's response, to a changed condition such as a prescription in light shade absorption lenses, particularly if he is asked leading questions will frequently result in the statement "I see better." Only a careful check can prove the veracity of this statement.

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THE INTERNATIONAL OPTICAL CONGRESS

The third International Optical Congress, which was held in England during the month of December, 1935, is now history. But it is history that each optometrist in the United States and in every country in the world should be acquainted with and of which he can be proud. The congress was held in Lady Margaret Hall, Oxford, England. Delegates from many countries attended and many of them contributed papers of great interest, which helped make this one of the most educational congresses in the history of optics and optometry. It is with a great deal of pride and satisfaction that the writer reviews this event, because it not only brought about a closer union and understanding amongst the optometrists of the various countries, but it also rendered a most valuable contribution to optical science and to optometric literature.

The papers presented at this meeting were reported in a special December issue of the Dioptric Bulletin, the official organ of the British Optical Association. This issue forms a good size book of about 400 pages and contains many instructive and interesting articles by leading practitioners and educators of England, France, Germany, Italy, Belgium and other countries. No attempt will be made here to give a complete

list of all of the papers presented at this congress, but mention should be made of a few so that the reader may have an idea of the magnitude and importance of this event: A note on the Stereophenomenon by Archbald; The Size of the Retinal Images, by Barker; Orthoptic Training, by Cole; The Paroptic Sense, by Flick; Disc Scotometry by Freeman; A Critical Examination of Communal Ametropia by Gasson; Color Vision Tests, and Routine Examination of Candidates by Giles; Influencing the Spherical Aberation of the Eye by van Heel; Light and Seeing by Johns; The Psycho-Physical Law in Visual Phenomena by Lowery; Some of the Factors Involved in the Treatment of Photophobia by Marton; An Illustrated Photographic Lecture on the Development of the Lens (from an ambryological standpoint) and the Development and Life of the Cell, by Mitchell and Freeman; Practical Retinoscopy by Moles; Myopia by Paxman; Relieving Asthenopia by Pistor; The Effects of Heredity and Environment on Axial Myopia, by Sutcliffe, and Orthoptic Training by Swann and Cole.

The papers read at this congress contain a wealth of practical as well as theoretical material. These, as has been said, were all published as part of the transactions of the British Optical Association in the special issue of the Association's official organ, the Dioptric Bulletin, which is edited by Dr. J. H. Sutcliffe, the president of the International Optical Association. To Dr. Sutcliffe and his co-workers, we offer you our congratulations upon this successful achievement. Your meeting must have been an inspiration to every optometrist in attendance, and your published report adds much to our science. Meetings of this character should be held oftener here in America and we are glad to note some disposition on the part of the officers of the American Optometric Association to enter this field and make their annual summer congress a meeting of real scientific interest. J. I. Kurtz.

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TOBACCO AMBLYOPIA

The tissues of the eye are susceptible to the action produced upon them by impurities and toxic effects brought to these ocular organs by the blood stream. A number of chemicals, drugs and poisons, when these are produced or absorbed in the system either intentionally or otherwise, so affect these tissues. There are other substances, however, not usually considered to be poisonous, which are in common use as stimulants and which may at times exercise a most deleterious influence upon the eyes when indulged in to excess. These are tobacco and alcohol, and it is of tobacco chiefly that the writer refers at this time.

That not all users of tobacco suffer from their eyes is apparent, as the use of tobacco is widespread and ocular complications from the habit are but infrequently met up with. Yet every optometrist has refracted

patients in whom the abuse of tobacco has seriously impaired sight. For this unfortunate occurrence several contingencies seem to be necessary. First, adult life; secondly, the absorption into the system of a large quantity of nicotine, either by chewing or smoking or by the prolonged handling of tobacco by workers in cigar or other factories in which the leaf is handled. A third factor is that of disturbed digestion, usually as an indirect consequence of tobacco abuse which is not infrequently associated with a too free use of alcohol on the part of the same patient.

The quantity of nicotine necessary for absorption before a tobacco amblyopia manifests itself, varies very greatly in different individuals. Many escape who must be saturated with the poison, showing that the degree of tolerance of tobacco varies to a marked degree in different individuals. Undoubtedly, the state of general health has much to do in maintaining this tolerance, large quantities of cigarettes and cigars being consumed without provoking any ocular symptoms, until a shock or prolonged mental strain or other derangement of the vital processes occurs, when the visual disability at once manifests itself.

The symptom first noted is usually in increasing difficulty in reading. Soon not only the type appears blurred, but distant objects as well appear fogged, the cloud being always densest between the eyes and the object regarded. The recognition of color is also affected and those engaged in occupations in which the recognition of color is requisite, such as railroad men are, in the more severe cases, no longer able to discriminate between red and green. Undoubtedly some railroad accidents have been caused by this interference with the color sense, the affection coming on so insidiously that the engineer who has previously had no difficulty in recognizing signals, and who has previously successfully passed color vision tests has no suspicion that his ability to discriminate between the colors of the signals has been impaired.

Most poisons have a selective tendency in their effect upon the structures of the body, and nicotine, in pursuance with this general rule, damages these fibers of the optic nerve which are connected with the macula lutea in the retina, thus affecting the seat of direct and most acute vision, the other portions of the nerve and retina to a large degree escaping. If in these cases use of tobacco is persisted in, total atrophy of these fibres follows and useful vision is lost.

From a diagnostic standpoint the ophthalmoscopic examination of this type of case shows but little. There may be a slight pallor of the temporal side of the nerve-head and perhaps in some cases a blurring of the margins of the disc. In severe cases small retinal hemorrhages may be present, as well as a central scotomata when the fields are charted on the campimeter. The perimeter too will give evidence of this condition with a marked contraction of the color fields, particularly the green and red. In severe cases the field for green disappears entirely.

The correction of the conditions is easy and obvious if taken in time. A marked reduction in the use of tobacco must be made, preferably

a complete elimination in its use for a period of time and when resumed to be used but sparingly. One thing is certain, that when the symptoms of tobacco amblyopia present themselves, there can be no hope of effecting a cure until the use of tobacco, at least for the time being, has been stopped altogether, and every other method has been tried to improve the general health of the patient. Carel C. Koch.

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SPECIAL REPORT

LECTURE PROGRAM ON THE ANATOMY, HISTOLOGY AND EMBRYOLOGY OF THE EYE*

Bernard Meyer, B.S., Opt.D.
New York, N. Y.

The Columbia University Optometry Alumni Association announce their spring lecture program for the year. This consists of a series of five lectures to be delivered by Professor Russell L. Carpenter, of the Department of Anatomy of the College of Physicians and Surgeons, Columbia University.

The prospectus for the series as prepared by Professor Carpenter is as follows: February 7th, Anatomy of the Eye and the Histology of the Eye and Lids. February 21st, Embryology of the Eye and Lids. March 6th, Anatomy of the Orbit; The Bony Orbit and Related Sinuses, the Orbital Fiscia and Associated Smooth Muscle, the Check Ligaments and the Blood Vessels and Lymphatics of the Orbit and Lids. March 20th, Nerve Supply of the Eye and Orbital Structures. April 3rd, Nerve Pathways and Reflexes.

This course of lectures is open to all optometrists, a small registration fee being charged those optometrists not members of the Alumni Association. The lectures will be given at the Pupin Physics Laboratories, Columbia University, 120th Street and Broadway, New York City. Each lecture will begin promptly at 8:15 P. M.

DR. BERNARD MEYER,
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*January 25, 1936.

A NOTE ON THE CHRONOMETRIC TECHNIC*

Z. J. Shoen, M.A., D.O.S.
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The purpose of this brief communication is to clarify several points regarding the chronometric technic of ocular muscle testing which was announced by the writer in a recent issue of this Journal. The *Convergence Index* is defined as the numerical value obtained by dividing the duration of a homonymous diplopia by the duration of a heteronymous diplopia, induced by prisms of equal powers. The indices of normal individuals, i.e., those not suffering from visual discomfort, usually fall within a certain, rather narrow range of values while those of patients professing lack of visual comfort seldom fall within this range. The writer wishes to stress the fact that the standard, or angular, tests administered to these individuals often yield negative results whereas disturbed convergence indices are noted and serve as bases for the diagnosis of muscular imbalances. It is felt that both testing methods must be applied to stubborn cases of muscular asthenopia. The interpretation of results obtained through the use of the chronometric technic as well as a number of typical case reports will be published in the 1936 Year Book of Optometry.

DR. Z. J. SCHOEN
PSYCHOLOGICAL LABORATORY
UNIVERSITY OF VIRGINIA
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THE OPTOMETRIST'S INCOME TAX—1936

Carel C. Koch, Opt.D.
Minneapolis, Minn.

The Federal Revenue Act of 1934, under which United States income tax returns must be filed on or before March 15th next, effects but few changes from the procedure followed in 1935 and no important changes which relates to optometrists as a class distinct from the main body of federal income taxpayers. The law reads that every one who is required to make a federal income tax return must do so on or before March 15, unless an extension of time for filing his return has been granted. For cause shown, the collector of internal revenue for the district

*Feb. 3, 1936

in which the taxpayer files his return, may grant such an extension on application filed with him by the taxpayer. Failure to make a return may subject the taxpayer to a penalty of 25 per cent of the amount of the tax due. The normal rate of tax on residents of the United States and on all citizens of the United States regardless of their places of residence, under the present Revenue Act is 4 per cent on net income in excess of the exemptions and credits.

Persons who must file returns

1. The Law states that returns must be filed by every person whose gross income in 1935 was $5,000 or more, regardless of the amount of his net income and of his marital status. If the aggregate gross income of husband and wife living together was $5,000 or more, they must file either a joint return or separate returns, regardless of the amounts of their joint or individual net incomes. In other words, every optometrist doing a gross annual business of $5,000 or more must file a return irrespective of the actual amount of profit he may have enjoyed during the fiscal year 1935.

2. For those persons whose gross income was less than $5,000 during the year 1935, a return must be filed first, by every single person and by every married person not living with his wife or her husband, whose net income was $1,000 or more, and second, by every married person living with his wife or her husband whose net income was $2,500 or more. If the aggregate net income of husband and wife, living together, was $2,500 or more, each may make a return or the two may unite in a joint return.

It is further provided that if the status of a taxpayer, so far as it affects his or her personal exemption or credit for dependents, has changed during the year, the personal exemption and credit must be apportioned, under rules and regulations prescribed by the Commissioner of Internal Revenue with the approval of the Secretary of the Treasury, in accordance with the number of months before and after such change. As a matter of courtesy only, blanks for returns are sent to taxpayers by the collectors of internal revenue, without request. Failure to receive a blank, however, does not excuse any one from making a return. Optometrists who have not already received an income tax blank should apply for one at once at the office of the local collector of internal revenue.

The following review of this subject covers only matters as they relate specifically to optometrists. Full information concerning questions of individual interest may be obtained from the official return blank itself, or if that is not sufficient from the collectors of internal revenue, at their local office.

Income Defined

Gross Income. An optometrist's gross income is the total amount of money received by him during the year for professional service and from the sale of spectacles, regardless of the time when the service or

sales were rendered for which the money was paid, plus such money as he has received as profits from investments and speculations and as compensations and profits from all other sources.

Net Income. Certain professional expenses and the expenses of carrying on any enterprise in which the optometrist may be engaged for gain may be subtracted as "deductions" from the gross income, to determine the net income on which the tax is to be paid. Optometrists who furnish spectacles may charge as income money received from such sales and deduct as an expense the cost of the material sold. Entries on the optometrist's account books should in such cases show charges for service separate and apart from charges for spectacles, etc. Service charges include such fees as are collected for examinations and for orthoptic treatments, etc. An "exemption" is allowed, the amount depending on the taxpayer's marital status during the tax year as stated above. These matters are fully covered in the instructions on the tax return blanks.

Earned Income. In computing the normal tax (but not the surtax) the optometrist may subtract from his net income from all sources, an amount equal to 10 per cent of the earned net income, except that the amount so subtracted shall in no case exceed 10 per cent of the net income from all sources. Earned income from an optometrist's standpoint means professional fees, salaries, and wages received as compensation for personal services, as well as profit received from the sale of spectacles, as distinguished from receipts from other sources.

As a matter of fact, it has been so ruled that the first $3,000 of an optometrist's or any professional man's net income from all sources may be regarded under the law as earned net income, whether it was or was not in fact earned within the meaning set forth in the preceding paragraph. Net income in excess of $3,000 may not be claimed as earned unless it in fact comes within that category.

Deductions Allowed for Professional Expenses

An optometrist is entitled to deduct all current expenses necessary in carrying on his practice. The optometrist should make, however, no claims for the deduction of expenses unless he is prepared to prove the expenditure by competent evidence. So far as practicable, accurate itemized records should be kept of expenses and substantiating evidence should be carefully preserved. The following statement shows what such deductible expenses are and how they are to be computed.

Rent. Office rent is deductible. If an optometrist rents an office for professional purposes alone, the entire rent may be deducted. If he rents a building or apartmnt for use as a residence as well as for office purposes, he may deduct a part of the rental fairly proportionate to the amount of space used for professional purposes. If the optometrist owns the building in which his office is located, he cannot charge himself with "rent" and deduct the amount so charged.

Office Maintenance. Optometrist's expenditures for office mainte-

nance, as for heating, lighting, telephone service and the service of attendants and assistants, are all deductible.

Supplies. Payments made by optometrists for supplies for professional use are deductible. Supplies may be fairly described as articles consumed in the using, for instance, stationery, postage for office use only, lenses, frames and cases. Professional journals may also be classified as supplies, and the subscription price deducted. Amounts currently expended for books, furniture, and professional instruments and equipment, "the useful life of which is short," generally less than one year, may be deducted; but if such articles have a more or less permanent value, their purchase price is a capital expenditure and is not deductible.

Equipment. Optometric equipment consists of property of a more or less permanent nature. It may in time wear out or become obsolete, but it is not in the ordinary sense of the word "consumed in the using." The cost of the optometric equipment acquired for professional use therefore cannot be deducted as expense in the year in which it has been purchased. Examples of this class of property are refracting room furniture, diagnostic and refractive equipment, office and reception room furniture, laboratory fixtures and equipment or any other permanent accessory, constituting a part of an optometrist's professional outfit, to be used over a considerable period of time, generally much over one year.

Although the cost of such optometric equipment is not deductible in the year acquired, nevertheless this cost may be recovered through depreciation deductions taken year by year over the useful life of the article described below:

It is generally agreed that no hard and fast rule can be laid down as to what part of the cost of equipment is deductible each year as depreciation. The amount depends to some extent on the nature of the equipment and on the extent and character of its use. The length of its useful life should be the primary consideration. The most that can be done is to suggest certain average or normal rates of depreciation for each of several classes of articles and to leave to the optometrist the modification of the suggested rates as the circumstances of his particular case may dictate. As fair average rates of depreciation, the following have been suggested: Refractive apparatus, laboratory equipment, physical therapy equipment, electrical sterilizers, and diagnostic apparatus, 10 per cent, office furniture, 5 per cent a year

In the study of this matter of depreciation one must remember that the principal, governing the determination of all rates of depreciation is that the total amount claimed for depreciation by the optometrist during the life of the equipment, plus the salvage value of the equipment at the end of its useful life, shall not be greater than its purchase price, or, if purchased before March, 1913, either its fair market value as of that date or its original cost, which ever may be greater The optometrist must in good faith use his best judgment and claim only such allowance for depreciation as the facts justify. The estimate of useful life, on

which the rate of depreciation is based, should be carefully considered by every practitioner for his own individual case.

Optometric Dues. Dues paid to optometric societies of a professional character are deductible. Dues paid to social organizations, even though their membership is limited to optometrists are personal expenses and not deductible.

Postgraduate Study. The Commissioner of Internal Revenue holds that the expense of postgraduate study is not deductible.

Traveling Expenses. Traveling expenses, including amounts paid for transportation, meals and lodging, necessarily incurred in attending optometric meetings for a professional purpose, are deductible.

As far as the optometrist is concerned, neither the cost of his automobile nor the maintenance charges are deductible. An optometrist doing an exclusive office practice and using his car merely to go to and from his office cannot deduct depreciation or operating expenses; but is regarded as using his car for his personal convenience and not as a means of gaining a livelihood.

Optical Laboratory Expenses. The deductibility of the expense of establishing and maintaining optical laboratories is determined by the same principles that determine the deductibility of corresponding professional expenses. Optical laboratory rental and the expenses of optical laboratory equipment and supplies and of laboratory assistants are deductible when under corresponding circumstances they would be deductible if they related to an optometrist's office.

Fire and Other Losses. Loss of and damage to an optometrist's equipment by fire, theft or other cause, not compensated by insurance or otherwise recoverable, may be computed as a business expense and is deductible, provided evidence of such loss or damage can be produced. Such loss or damage is deductible, however, only to the extent to which it has not been made good by repair and the cost of repair claimed as a deduction.

Deductible Insurance Premiums. Premiums paid for insurance against professional losses only are deductible. This includes insurance against damages for alleged malpractice, and against loss from theft of professional equipment, and damage to or loss of professional equipment by fire or otherwise.

The foregoing comprises the essential data on which the optometrist income tax for the year is computed. As in previous years, it is well, before attempting to fill out the blank, to marshall all pertinent data as to gross income and all expenditures into their own specified subdivisions. When this is done, the task of filling out the chart becomes fairly easy. Here too, as in previous years, the extra duplicate (white) sheet should first be used. After this has been correctly filled out the other white original can be copied in full from the duplicate which the optometrist will keep for his own files. For 1935 it is also necessary to fill in and

mail with the original a duplicate report which is printed on green paper. This is an entirely new feature this year. These green reports are to be kept in the state offices for reference by state officials.

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ABSTRACTS

ANALYSIS OF REFRACTION FINDINGS. W. Gasson. The Dioptric Review. Vol. XXXVII. No. 3, pp. 117-138. 1935.

Gasson selects from his practice, a group of some 592 cases, taking these in the order in which he was called to work upon them. The only selection which was made, was apparently, that these cases were all optometric ones and therefore subject to optometric refractive procedure. The author then studies these cases in great detail, making a number of analyses from the findings as recorded in his records. Of the 592 cases, 234 were males and 358 were females or a percentage of 39.6 per cent males and 60.4 per cent females. Of the principle refractive findings it is interesting to note that Gasson found 408 cases of the total of 592 to be hyperopic. That is hyperopia played some part in their ametropic findings. 184 cases were, on the other hand, myopic or had myopia as a part of their refractive defects. Thus in a very general break-down he found 68.9 per cent of the cases to be hyperopic and 31.1 per cent of the cases to be myopic. Of this same group it is interesting also to note that 412 cases or 69 per cent of the total had astigmatism varying from one-half diopter up to three and one-half diopters. Gasson makes a complete statistical analysis of all of the cases, studying these through age groups, by sex and by types of refractive findings. C. C. K.

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ALLERGY AND CATARACTS. W. R. Buffington. Journal of the American Medical Association. Vol. 105, No. 7, p. 483. 1935.

Buffington claims that the delicate tissues of the eye are often profoundly influenced by all forms of intensive light therapy. In his discussion of this matter he cites the case of a patient who suffered from lenticular changes following intensive ultra-violet radiation given over a period of time for external ocular lesions. The history of this case shows that for two years prior to January, 1934, the patient had suffered from

a severe dermatitis which affected his face and neck. During the months of January and February, 1934, he was given intense ultra-violet treatment in the hope of relieving this condition. At this time his eyes were normal. A few weeks following the last treatment he complained that his vision was becoming blurred and in August of the same year a diagnosis of irradiation cataract was made, the central portion of the anterior capsule of the crystalline lens of each eye being quite opaque. Buffington then claims that careful observers have noted that this type of cataract frequently follows intensive light therapy. C. C. K.

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PRESCRIBE LIGHT WHEN YOU PRESCRIBE LENSES. M. J. Julian, Journal of the American Optometric Association, Vol. 7, No. 6, pages 12-13, 1936.

Julian reviews the steps to be taken by the optometrist in his detailed prescribing of illumination intensities at the close of the refraction, for the near-point needs of his patients. According to Julian these steps are, first, to consider all of the near-point work done by the patient. This includes near work done at home and at work in either the office or factory as well as a consideration of any hobbies which may require the indoor use of the eyes at the near-point. Second, charts have been prepared illustrating in as exact form as possible various types of near-point work. These charts are then put into use with the patient holding them at as near the actual working distance as can be estimated in the refracting room. The patient has his or her near-point correction in place while so doing. Third, a variable illuminator is then used while the patient is doing the near-point work. This illuminator consists of an adjustable lamp with a rheostat control which gives the patient an idea of the importance of illumination in visual work. Fourth, at the same time various intensities of illumination are being tried by the patient, a foot-candle meter or what is now called a sight-meter is used in checking the intensity of illumination at the working distance which seems most satisfactory to the patient for the particular work at hand. Fifth, after various tests of this sort have been made a light-prescription is written for the patient. This light-prescription indicates the approximate amount of illumination intensity which seemed by this subjective test to give the patient the greatest comfort while doing ocular work at the near-point. C. C. K.

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STRABISMUS AND REFRACTION. W. H. Crisp. The American Journal of Ophthalmology. April, 1935.

Crisp feels that in treating an amblyopic ex anopsic case in which there is squint present, the procedure of suppressing the acuity of vision

of the non-squinting eye is a mistake. He claims that by so doing one creates a disturbance in the cerebral ocular co-ordination centers and the brain is therefore not given the opportunity to coordinate the visual impressions upon the basis of the accommodative effort required. He suggests that in these cases each eye should receive the most carefully balanced correction and that each eye should be as fully corrected as possible. C. C. K.

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VISUAL STANDARDS FOR AUTOMOBILE DRIVERS—A REPORT OF THE RESEARCH DEPARTMENT OF THE AMERICAN OPTOMETRIC ASSOCIATION. Edwin H. Silver. Journal of the American Optometric Association, Vol. 7, No. 6, pages 14-20, 1936.

In this article Silver presents the suggested visual standards for automobile drivers and also the suggested examination procedures for the use of traffic officials, licensing bureaus and optometrists who are to engage in this work. The article is a report on this subject from the department of research of the A. O. A., of which Silver is the head.

This report deals chiefly with the results of research work done by Dr. A. R. Lauer, of Iowa State College, much of the work being performed by Dr. Lauer and his associates in a portable clinic designed for this purpose, and used in the field during the past seven summers. This portable clinic itself was described by Lauer in the AMERICAN JOURNAL OF OPTOMETRY.[1]

As a result of their investigations the report advises or suggests that three separate methods be followed (1) a procedure for local traffic bureaus; (2) a procedure for special licensing bureaus or State Highway Departments; and (3) a procedure to be followed by the individual optometrist in his own office, should he be called upon to make a drivers survey or examination. The report goes into considerable detail and much material of value in this work is presented. C. C. K.

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[1]Lauer, Alvah R. A portable research clinic and its value. American Journal of Optometry, Vol. 12, No. 3, pages 85-90. (Ill.) 1935.

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